Study Protocol

Title: Comparison of Different Ventilator and Vaporizer Technologies to Study Economic and Environmental Implications

NCT#: 04851314

Date: 10-05-2018

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PROTOCOL NARRATIVE FOR EXPEDITED OR FULL COMMITTEE RESEARCH

University of California, Irvine
Institutional Review Board
Version: April 2013

HS#: 2014-1248
For IRB Office Use Only

Lead Researcher Name: Robert Ryan Field, MD
Study Title: Low-flow Anesthesia: Cost-effectiveness of the FLOW-i Anesthesia Machine, a Comparison to Established Anesthesia Delivery Unit

NON-TECHNICAL SUMMARY

Provide a non-technical summary of the proposed research project that can be understood by IRB members with varied research backgrounds, including non-scientists and community members. The summary should include a brief statement of the **purpose of the research** and **related theory/data supporting** the intent of the study as well as a brief description of the **procedure(s) involving human subjects**. ***This summary should not exceed ½ page.***

During general surgery, patients receive a series of standard medications to induce and maintain anesthesia and pain control. The anesthesia machines help deliver these inhaled anesthetics, while at the same time breathing for the patients. Most anesthesia machines have large volume breathing circuits that needlessly waste inhaled gas anesthetics. An FDA-approved FLOW-i C20 anesthesia machine uses a low volume system without large reservoirs.

The primary aim of this research is to evaluate the cost-effectiveness of the MAQUET FLOW-i C20 machine. Reducing the circuit volume can have many benefits. Most anesthesia machines require higher fresh gas flows and deliver fresh gas flow throughout the entire respiratory cycle. The Maquet machine requires significantly less fresh gas flow and only delivers fresh gas flow during inspiration. **The purpose of this study is to compare the MAQUET FLOW-i machine to high volume anesthetic machines.**

SECTION 1: PURPOSE AND BACKGROUND OF THE RESEARCH

1. Describe **the purpose of the research** project and state the overall objectives, specific aims, hypotheses (or research question) and scientific or scholarly rationale for performing the study.
2. Provide the **relevant background information** on the aims/hypotheses (or research question) to be tested and the procedures/products/techniques under investigation.
3. Include a description of the **primary outcome variable(s), secondary outcome variables, and predictors** and/or comparison groups as appropriate for the stated study objectives.
4. Include a critical evaluation of **existing knowledge**, and specifically identify the information gaps that the project intends to address.
5. Describe **previous research** with animals and/or humans that provides a basis for the proposed research. **Include references/citations**, as applicable.

This section should not exceed 4 pages.

The purpose of this study is to test whether or not the use of a low volume ventilator in an anesthesia machine reduces anesthetic costs significantly as compared to other high volume machines. The study will compare the FLOW-i anesthesia machine to a GE anesthesia machine

during routine elective general surgery in patients with ASA ratings of 1-2 under general anesthesia receiving standard care.

General anesthesia based on the administration of inhaled anesthetics is common practice. The clinical use of sevoflurane is standard of care in the operating room. There are today a variety of anesthetic devices introducing the gas in somewhat different manners. The technical solution has an impact on entire gas consumption. Techniques providing safe and effective anesthesia but with a minimum of waste is sought in order to decrease direct drug related costs.

1. **Primary study variable:** amount of gas vaporized anesthetic per minute anesthesia.
2. **Secondary study variables:**
    a. Time to reach Aldrete > 8
    b. Time to extubation from weaning
    c. Maquet firmware-based volatile anesthetic consumption data

Sevoflurane an inhaled halogenated anesthetic has physiochemical properties promoting its use in low flow anesthesia.

Low blood gas solubility promotes in theory the use of the third generation inhaled anesthetics for use during general anesthesia with low fresh gas flow. The benefits of low blood and tissue solubility during low and minimal flow are not yet studied.

Reducing the fresh gas circuit volume has many benefits; it reduces the risk for unnecessary workplace contamination, environmental pollution and it is cost-effective. Intravenous (IV) propofol based anesthesia has become increasingly popular. The low volume inhaled anesthesia technique would assumingly also become cost-effective rivalling generic low price propofol. The simplicity to start and continuously monitor anesthetic depth which is difficult with IV anesthetics should also be recognized.

The breathing circle should attain an adequate gas mixture of inhaled; oxygen and inhaled agent as well as the absence of carbon dioxide. The anesthetic machine provides the fresh gas entering the breathing circle. The delivery of fresh gas differs between machines. The feeding of fresh gas and subsequent anesthetic vapor in to the breathing circle differs between devices. The amount of vapor introduced to the breathing circle has a major impact on the gas kinetics and subsequent need for total gas delivered.

Avramov MN, Griffin JD, White PF. *The effect of fresh gas flow and anesthetic technique on the ability to control acute hemodynamic responses during surgery*. Anesth Analg. 1998; 87: 666-70.

Choi SU, Shin HW, Jung HI, Park JY, Yoon SZ, Lee YS, Kim WY, Chang SH. *Control of the haemodynamic response to surgical stimuli in semi-closed circuit or closed circuit anaesthesia using a multifunctional anaesthesia system*. J Int Med Res. 2010; 38: 1637-44.

SECTION 2: ROLES AND EXPERTISE OF THE STUDY TEAM

List all study team members below.

1. Identify each **member's position** (e.g., Associate Professor, graduate or undergraduate

student) and **department**, and describe his or her **qualifications, level of training and expertise.** Include information about relevant licenses/medical privileges, as applicable.
2. Describe each team member's **specific role and responsibility** on the study.
3. **Faculty Sponsors** - list as Co-Researchers and describe their role on the project; include oversight responsibilities for the research study.
4. Explain who will have **access to subject identifiable data**.
5. Indicate who will be **involved in recruitment, informed consent process, research procedures/interventions, and analysis of data.**

Lead Researcher:

Robert Ryan Field, MD is an Assistant Clinical Professor of the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Dr. Field is a practicing anesthesiologist that directs neuroanesthesiology services, and co-directs the CA3 curriculum. He is published in ICU delirium and ICU Sedation, has worked in multiple research laboratories ranging from work as a design engineer to FDA/TÜV documentation compliance officer for medical devices and processes. Duties include: access to identifiable data, recruitment of patients, consenting of patients, and involvement in research, procedures, and data collection.

Co-Researchers:

Cameron Ricks, MD is an Associate Clinical Professor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Coral Sun, MD is an Assistant Clinical Professor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Corey Nelson, MD is an Assistant Clinical Professor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Darren R. Raphael, MD, MBA is a Clinical Instructor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Dmitry Portnoy, MD is an Associate Professor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Joseph B. Rinehart, MD is an Associate Clinical Professor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Kimberly Gimenez, MD is a Clinical Professor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Leslie Garson, MD is an Assistant Clinical Professor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Navid Alem, MD is an Assistant Clinical Professor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Richard Kelly, MD, MPH is an Assistant Clinical Professor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Shalini Shah, MD is an Assistant Clinical Professor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Shermeen B. Vakharia, MD, MBA is a Clinical Professor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Trung Vu, MD is an Assistant Clinical Professor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Kyle Ahn, MD is an Associate Clinical Professor in Regional Anesthesia & Acute Pain Medicine, Interim Director for the Residency Program, and Fellowship Program Director in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Jane Ahn, MD is an Associate Clinical Professor and Director of Acute Pain and Regional Service in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Ho Joon Choi, MD is a Clinical Professor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection

Anna Harris, MD is a Clinical Professor, Associate Program Director for the Residency Program and the Director of the Perioperative Clinic in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Suzanne Strom, MD is an Associate Clinical Professor and Director of the Residency Program in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Waylan Wong, MD is an Assistant Clinical Professor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Gregory Yoshikawa, MD is an Assistant Clinical Professor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.
Financial Interest: No

Howard Schwid, MD is a Clinical Professor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Ramin Rahimian, MD, MBA is an Assistant Clinical Professor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Ariana Nelson, MD is an Assistant Clinical Professor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Chinsui Chou, MD is an Assistant Clinical Professor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Kyle Paredes, MD, MBA is an Assistant Clinical Professor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Aaron Przybysz, MD, PhD is an Assistant Clinical Professor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research,

procedures, data collection.

Taizoon Dhoon, MD is an Assistant Clinical Professor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Yashar Eshraghi, MD is an Assistant Clinical Professor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data collection.

Rakhi Dayal, MD is an Associate Clinical Professor in the Department of Anesthesiology and Perioperative Care at UC Irvine Medical Center. Duties include: access to identifiable data, recruitment of patients, consenting of patients, involvement in research, procedures, data

Research Personnel:

Paulette Mensah, BA is a clinical researcher in the Department of Anesthesiology and Perioperative Care at UCIMC. Duties include: access to identifiable data, consenting of subjects to confirm willingness to participating in research; however, she will not discuss the specifics of administering anesthesia or finalize the consent process as only a qualified, licensed physician is able to do so; involvement in collection of data.

Michael Ma, BS is a clinical researcher in the Department of Anesthesiology and Perioperative Care at UCIMC. Duties include: access to identifiable data, consenting of subjects to confirm willingness to participating in research; however, he will not discuss the specifics of administering anesthesia or finalize the consent process as only a qualified, licensed physician is able to do so; involvement in collection of data.

Michael-David Calderon, BS, is a clinical researcher in the Department of Anesthesiology and Perioperative Care at UCIMC. Duties include: access to identifiable data, consenting of subjects to confirm willingness to participating in research; however, he will not discuss the specifics of administering anesthesia or finalize the consent process as only a qualified, licensed physician is able to do so; involvement in collection of data.

David Avila, BS is a volunteer research intern in the Department of Anesthesiology and Perioperative Care at UCIMC. Duties include: access to identifiable data, consenting of subjects to confirm willingness to participating in research; however, he will not discuss the specifics of administering anesthesia or finalize the consent process as only a qualified, licensed physician is able to do so; involvement in collection of data.

Yousif Arif is an undergraduate research student in the Department of Anesthesiology and Perioperative Care at UCIMC. Duties include: access to identifiable data, consenting of subjects to confirm willingness to participating in research; however, he will not discuss the specifics of administering anesthesia or finalize the consent process as only a qualified, licensed physician is able to do so; involvement in collection of data.

Elika Salimi is an undergraduate research student in the Department of Anesthesiology and Perioperative Care at UCIMC. Duties include: access to identifiable data, consenting of subjects to confirm willingness to participating in research; however, she will not discuss the specifics of administering anesthesia or finalize the consent process as only a qualified,

licensed physician is able to do so; involvement in collection of data.

Nagi Alazani is an undergraduate research student in the Department of Anesthesiology and Perioperative Care at UCIMC. Duties include: access to identifiable data, consenting of subjects to confirm willingness to participating in research; however, he will not discuss the specifics of administering anesthesia or finalize the consent process as only a qualified, licensed physician is able to do so; involvement in collection of data.

Bianca Abramian is an undergraduate research student in the Department of Anesthesiology and Perioperative Care at UCIMC. Duties include: access to identifiable data, consenting of subjects to confirm willingness to participating in research; however, she will not discuss the specifics of administering anesthesia or finalize the consent process as only a qualified, licensed physician is able to do so; involvement in collection of data.

Alexis Carmona is an undergraduate research student in the Department of Anesthesiology and Perioperative Care at UCIMC. Duties include: access to identifiable data, consenting of subjects to confirm willingness to participating in research; however, she will not discuss the specifics of administering anesthesia or finalize the consent process as only a qualified, licensed physician is able to do so; involvement in collection of data.

Hailey Maxwell is a research volunteer in the Department of Anesthesiology and Perioperative Care at UCIMC. Duties include: access to identifiable data, consenting of subjects to confirm willingness to participating in research; however, she will not discuss the specifics of administering anesthesia or finalize the consent process as only a qualified, licensed physician is able to do so; involvement in collection of data.

Nikhil Crain is a research volunteer in the Department of Anesthesiology and Perioperative Care at UCIMC. Duties include: access to identifiable data, consenting of subjects to confirm willingness to participating in research; however, she will not discuss the specifics of administering anesthesia or finalize the consent process as only a qualified, licensed physician is able to do so; involvement in collection of data.

Frank Major is an undergraduate research student in the Department of Anesthesiology and Perioperative Care at UCIMC. Duties include: access to identifiable data, consenting of subjects to confirm willingness to participating in research; however, she will not discuss the specifics of administering anesthesia or finalize the consent process as only a qualified, licensed physician is able to do so; involvement in collection of data.

Kendrick Bai is an undergraduate research student in the Department of Anesthesiology and Perioperative Care at UCIMC. Duties include: access to identifiable data, consenting of subjects to confirm willingness to participating in research; however, she will not discuss the specifics of administering anesthesia or finalize the consent process as only a qualified, licensed physician is able to do so; involvement in collection of data.

Yuhan Li is an undergraduate research student in the Department of Anesthesiology and Perioperative Care at UCIMC. Duties include: access to identifiable data, consenting of subjects to confirm willingness to participating in research; however, she will not discuss the specifics of administering anesthesia or finalize the consent process as only a qualified, licensed physician is able to do so; involvement in collection of data.

Rita Khechumyan is an undergraduate research student in the Department of Anesthesiology and Perioperative Care at UCIMC. Duties include: access to identifiable data, consenting of subjects to confirm willingness to participating in research; however, she will not discuss the specifics of administering anesthesia or finalize the consent process as only a qualified,

licensed physician is able to do so; involvement in collection of data.

Salama Sheren is an undergraduate research student in the Department of Anesthesiology and Perioperative Care at UCIMC. Duties include: access to identifiable data, consenting of subjects to confirm willingness to participating in research; however, she will not discuss the specifics of administering anesthesia or finalize the consent process as only a qualified, licensed physician is able to do so; involvement in collection of data.

SECTION 3: RESEARCH METHODOLOGY/STUDY PROCEDURES

A. Study Design and Procedures

1. Provide a **detailed chronological description of all study activities** (e.g., pilot testing, screening, intervention/interaction/data collection, and follow-up) and **procedures**.
   a. Include an explanation of the study design (e.g., randomized placebo-controlled, cross-over, cross-sectional, longitudinal, etc.) and, if appropriate, describe stratification, randomization, and blinding scheme.
   b. Provide precise definitions of the study endpoints and criteria for evaluation; if the primary outcomes are derived from several measurements (i.e., composite variables) or if endpoints are based on composite variables, describe precisely how the composite variables are derived.
   c. Indicate how much **time will be required of the subjects**, per visit and in total for the study.
   d. Indicate the **setting where each procedure will take place**/be administered (e.g. via telephone, clinic setting, classroom, via email). ***Note:*** *If any of the procedures will take place at off-campus locations (e.g., educational institutions, businesses, organizations, etc.)* ***Letters of Permission*** *are required.*
   e. If a procedure will be completed more than once (e.g., multiple visits, pre and post survey), indicate **how many times** and the **time span** between administrations.
2. **For studies that involve routine (standard of care) medical procedures:** Make clear whether procedures are being done for clinical reasons or for study purposes, including whether the procedures are being done more often because of the study. Use the following guidelines to determine the extent to which standard procedures and their associated risks need to be described in protocol:
   a. If the standard procedure is not explicitly required by the study protocol, the protocol need not describe that procedure or its risks.
   b. If the standard procedure is a main focus of the study (e.g., one or more arms of a randomized study is standard) or is explicitly required by the study protocol, the protocol must include a full description of the procedure and its risks.]
3. It is **strongly recommended** that you include a table of visits, tests and procedures. Tables are easier to understand and may help to shorten long repeated paragraphs throughout the narrative.
4. If study procedures include collecting **photographs, or audio/video recording**, specify whether any subject identifiable information will be collected and describe which identifiers will be collected, if any.
5. Describe how the **subject's privacy will be protected** during the research procedures. ***Note****: This is not the same as confidentiality (see the Privacy and Confidentiality web page).*
6. Be sure to submit **data collection instruments** for review with your e-IRB Application (e.g., measures, questionnaires, interview questions, observational tool, etc.).

The study member will screen for potential subjects using the UCIMC surgical schedule. If a subject is deemed ineligible based on the inclusion and exclusion criteria after reviewing the medical history, his/her record will be discarded. No records will be retained from ineligible subjects. After discussing with the patient's surgeon, study team member will initiate the informed consent process by approaching each eligible subject to explain the study and what it entails. The Lead Researcher will address all questions and concerns from the subject before asking the subject to sign the research consent form.

The GE anesthesia machines currently owned by the operating room will be used to serve as the comparator to the Flow-i machine. The high volume anesthesia machines do not use a low volume system. Subjects will be randomized by recruitment day. On a given recruitment day, all consented subjects will receive anesthesia from one of two groups:

(1) MAQUET FLOW-i device
(2) GE anesthetic device

Time points for both groups include:

T_0: Time of intubation, when volatile anesthetic are typically first delivered to the patient. We will use 15L/min fresh gas flow, while dictating tidal volumes of 6-8 mL/kg ideal body weight and a PEEP of 6 centimeters of water (cm H_2O) in accordance with current best practices.

T_1: Time of incision, which typically represents the time of reaching steady state conditions of volatile anesthetic delivery. We will reduce fresh gas flow to 2 L/min in accordance with local practice and weigh the vaporizer at this point, allowing us to measure comparative anesthetic consumption during this wash-in time period (T_0-T_1).

T_2: Time of anesthetic weaning, typically the time when preparing for patient emergence begins by discontinuing the delivery of volatile anesthetics to the patient. The vaporizer will be re-weighed at this point, allowing us to measure comparative anesthetic consumption at steady state maintenance of anesthetic depth (T_1-T_2)

Logically, we will also be able to use T_0-T_2 in order to understand total comparative anesthetic consumption.

Aside from the randomization to either Group 1 or Group 2, there will be no changes in the surgical or anesthetic procedure, including the medication or treatments given to the subjects as determined by the treating physician. All subjects will receive general anesthesia in accordance to local practice.

For this study, the vaporizer(s) will be weighed on a tared scale before research procedures commence, after induction, and when the gas is shut off during weaning of anesthesia in preparation for extubation to calculate the amount consumed during this time (grams/minute). In addition, the following variables will be recorded:

- Subject weight (kg)
- Tidal Volume (TV)
- Respiratory Rate (RR)

- Positive end-expiratory pressure (PEEP)
- Fresh Gas Flow
- Volume % gas
- End Tidal (%)
- Time of extubation
- Time when Aldrete score > 8

This is not a physician-blinded study being that the physical characteristics of the standard delivery units are distinguishable from the MAQUET FLOW-i machine.

All MAC concentrations are standard of care: After the surgical procedure, patient will be assessed for time to reach Aldrete score greater than 8, level of pain and time to extubation. Their medical records will be reviewed to determine need for times and adverse events. Patients will not be contacted for study-related follow-up after they are discharged from recovery.

No photographs or audio/video recording will be collected for this study.

Subject's Privacy:
The study team member will screen for potential subjects using the UCIMC surgical schedule. If a subject is deemed ineligible based on the inclusion and exclusion criteria after reviewing the medical history, his/her record will be discarded. No records will be retained from ineligible subjects.

Study team member will approach each eligible patient to explain the study and what it entails. The study team member will address all questions and concerns from the subjects before asking the patient to sign the research consent form.

B. Statistical Considerations

1. **Statistical Analysis Plan:** Describe the statistical method(s) for the stated specific aims and hypotheses **described in Section 1**. ***Note:*** *Required for scientific review.*
2. **Explain how the overall target sample size was determined** (Provide power / sample size justification for the study).

If a statistical analysis plan is not appropriate for your study design, please describe a plan for assessing your study results.

The primary purpose of this study is to evaluate the Maquet anesthesia workstation in regards to savings of volatile agent compared to conventional machines. As the Maquet workstation is more expensive than conventional machines, there must be a substantial cost-savings in terms of volatile agent to offset the additional up-front cost. The typical service life of an anesthesia workstation is around 5 years. For powering this study we decided that to be cost-effective the Maquet machines must save enough volatile agent in 1.5 years to offset the cost-difference, leaving the remaining service lifetime as profit over conventional machines.

Since volatile agent use is not recorded on a per-case basis, nor is it possible to determine from the anesthesia intra-op record, we also needed to estimate the approximate volatile use per case. Volatile use increases with length of case, fresh gas flow rate, and vaporizer percent-saturation setting. From pharmacy purchase records, we know that the average monthly Sevoflurane purchase over the past two years at UCI is $11,700 ± $6,200. Averaged out over approximately 20 OR locations using Sevoflurane daily and about 30.5 days in a month, this gives us $19.2 ±

10.2 per OR per day cost. Finally, assuming 40 cases per day in the main OR spread over those 20 rooms gives us two cases per day on average per room, or $9.6 ± 5.0.

The cost difference in the Maquet machines is approximately $50,000 over conventional machines, meaning the total Sevoflurane reduction must amount to $50,000 over 1.5 years. With $11,700 per month average over 1.5 years totaling $210,000, a $50,000 reduction represents about a 25% reduction in total use.

So, assuming we will have two groups (Maquet and conventional) for which we will measure Sevoflurane use during cases, the Maquet machine must use 25% less Sevoflurane to be cost-effective. With a per-case cost of $9.6 ± 5.0 for the conventional group, we must have sufficient power to differentiate whether the Maquet group has a cost of $7.2 ± 5.0 per case (assuming equal case variance for this group).

With a power of 0.8 (20% type II risk), a significance level of 0.05 (type I risk of 5%), and using a one-sided t-test to compare groups, we require two groups of 55 patients (n=110 total) in each group – Group 1: Maquet Anesthesia Machine, Group 2: GE Anesthesia Machine– to detect a 25% change in cost. An additional 11 subjects (10% attrition rate) will be included to the target sample size to account for unforeseen circumstances leading to an exclusion i.e. mechanical failure, incomplete data, different anesthetic device etc.

SECTION 4: SUBJECTS (PERSONS/CHARTS/RECORDS/SPECIMENS)

A. Number of Subjects (Charts/Records/Biospecimens)

1. Indicate the **maximum number of subjects to be recruited/consented** on this UCI protocol. This is the number of potential subjects you may need to recruit to obtain your target sample size. This number should include projected **screen failures and early withdrawals**. ***Note:*** *The IRB considers individuals who sign the consent form to be "enrolled" in the research.*
2. For **Mail/Internet surveys** include the number of people directly solicited.
3. If the study involves use of **existing charts, records, biospecimens**, specify the maximum number that will be reviewed/tested to compile the data or the sample population necessary to address the research question.

1. The maximal sample size is 128 subjects. The target sample size at UCI is 110 subjects. 55 patients for Group 1 (Maquet), 55 patients for Group 2 (GE machine)
2. N/A
3. N/A

4. Of the maximum number of subjects listed above, indicate the **target sample size** for the study. This is the number of subjects expected to complete the study or the number necessary to address the research question.
5. *For social/behavioral research*, the maximum sample size is often similar to the target sample size. If the **maximum sample size** is significantly greater (i.e., ≥ 1.5x) than the **target sample size** provide a justification.
6. For studies where multiple groups of subjects will be evaluated, **provide a breakdown per group** (e.g. controls vs. experimental subjects; children vs. adults; by age group).

4. The maximal sample size is 128. To achieve statistical significance, the target sample size is 110 subjects with 55 subjects in Group 1 (Maquet) and 55 subjects in Group 2 (GE Aisys). An additional 11 subjects (10% attrition rate) were included to the target sample size to account for unforeseen circumstances leading to an exclusion i.e. mechanical failure, incomplete data, different anesthetic device etc.
5. N/A
6. N/A

7. For **multi-center research**, indicate the overall sample size for the entire study (across all sites).

[X] Not applicable - This study is not a multi-center research study.

8. Demonstrate that the **target sample size will be sufficient** to achieve the study goal and should coincide with the statistical approach **described in Section 3B**. ***Note:*** *Required for scientific review.*
9. **Sources and information** of assumed group effects and variability should be supplied (e.g., pilot data; data from related literature). ***Note:*** *Required for scientific review.*

Please reference the Statistical Plan in Section 3.B. for information pertaining to the sufficiency of the target sample size.

B. Inclusion and Exclusion Criteria

1. Describe the **characteristics and provide justification** for inclusion of the proposed subject population. At a minimum include information about the age and gender of the study population.
2. Describe **different subject groups** (e.g., students and teachers; control group and treatment group(s), children and adults) separately.

Adult subjects undergoing surgery and scheduled for elective general anesthesia, with ASA 1-2, will be recruited to participate in this study.

3. Provide the **inclusion and/or exclusion criteria** for the proposed subject population, as applicable.

[ ] Not applicable – This is not a clinical investigation and/or the characteristics of the population sufficiently describe the proposed subject population.

Inclusion criteria:

- Age 18-65 years
- Undergo surgery under general anesthesia in UCI Medical Center
- Agree to sign the consent and HIPAA forms

- Subjects who are able to receive sevoflurane

Exclusion criteria:

- Subjects under the age of 18
- Chronic Obstructive Pulmonary Disease (COPD)
- Body Mass Index (BMI) > 30
- ASA > 2
- Pregnant females
- Procedures less than 2 hours
- Those with known sensitivity to sevoflurane or other halogenated agents; those with known or suspected susceptibility to malignant hyperthermia
- Severe Cardiovascular Disease: Left Ventricular Ejection Fraction (LVEF) < 30%

4. If **exclusion** is based on age, gender, pregnancy/childbearing potential, social/ethnic group, or language spoken (e.g., Non-English Speakers), **provide a scientific rationale**.

Subjects who are younger than 18 years of age are physiologically different compared to the general population and hence, their data will create unnecessary skew when we perform statistical tests. Pregnant women have a significantly different respiration physiology which would skew data significantly.

SECTION 5: RECRUITMENT METHODS AND PROCESS

A. Recruitment Methods

Please check **all** applicable recruitment methods that apply to the study. Place an "**X**" in the bracket **[ ]** next to the recruitment method.

[ ] This study involves no direct contact with subjects (i.e., use of existing records, charts, specimens)

- ***Skip to Section 6.***

[ ] UCI IRB approved advertisements, flyers, notices, and/or media will be used to recruit subjects. ***Submit advertisements for IRB approval.***

- Passive Recruitment - Potential subjects initiate contact with the study team.
- ***Complete Question 5B - Explain where recruitment materials will be posted.***

[ ] The study team will recruit potential subjects who are unknown to them (e.g., convenience sampling, use of social networks, direct approach in public situations, random digit dialing, etc.)

- Active Recruitment – Researchers contact potential subjects.
- ***Complete Question 5B.***

[ ] The UCIMC Clinical Trials web page will be used. ***Submit the UCIMC Standard Research***

Recruitment Advertisement for IRB approval.

- Passive Recruitment - Potential subjects initiate contact with the study team.
- ***Skip to Section 6.***

[X] The study will be listed on Clinicaltrials.gov. ***Note:*** *This is required for all clinical trials.*

- Passive Recruitment - Potential subjects initiate contact with the study team.
- **Skip to Section 6.**

[ ] The UCI Social Sciences human subject pool will be used. ***Submit the Social Science Human Subject Pool Recruitment Advertisement for IRB approval.***

- Passive Recruitment - Potential subjects initiate contact with the study team.
- ***Skip to Section 6.***

[ ] Study team members will contact potential subjects who have provided permission to be contacted for participation in future research studies.

- Active Recruitment – Researchers contact potential subjects.
- ***Complete Question 5B – Explain when and how these individuals granted permission for future contact; provide the IRB protocol numbers, if applicable.***

[X] Study team members will approach their own patients, students, employees for participation in the study.

- Active Recruitment – Researchers contact potential subjects.
- ***Complete Question 5B.***

[ ] Study team members will send UCI IRB approved recruitment materials (e.g., recruitment flyer, introductory letter) to colleagues asking for referral of eligible participants.*

- Passive Recruitment – Potential subjects initiate contact with the study team or
- Active Recruitment – Colleagues get permission from interested individuals to release contact information to researchers. Researchers contact potential subjects.
- ***For Active Recruitment, complete Question 5B.***

****Note:*** *Additional requirements for using this recruitment method are included in the Protocol Narrative instructions.*

[ ] Study team members will provide their colleagues with a UCI IRB approved introductory letter. The letter will be signed by the treating physician and sent to his/her patients to inform them about how to contact study team members.

- Passive Recruitment - Potential subjects initiate contact with the study team.
- The IRB approved letter must be sent by the treating physician.
- The study team does not have access to patient names and addresses for mailing.
- ***Skip to Section 6.***

[X] UCI study team members will screen UCIMC medical records to determine subject eligibility and approach patients directly about study participation.*

- Active Recruitment – Researchers contact potential subjects.
- ***Complete Appendix T to request a partial waiver of HIPAA Authorization.***

- ***Complete Question 5B.***

** **Note** Additional requirements for using this recruitment method are included in the Protocol Narrative instructions.*

[ ] Other Methods: <indicate the recruitment method(s) here>

- ***Complete Question 5B, as applicable.***

B. Recruitment Process

1. Based on the methods checked above, describe and provide **details of the recruitment process** (i.e. when, where, by whom and how potential subjects will be approached, e.g. screening medical charts, findings subjects during routine patient visits, etc.).
2. If you will recruit by mail, e-mail, or phone, explain how potential subjects' **contact information will be obtained**.
3. If active recruitment methods will be used (i.e., researchers will make direct contact with subjects for the purpose of recruitment), explain how the individual's **privacy will be protected**. ***Note:*** *This is not the same as confidentiality (see the Privacy and Confidentiality web page).*

1. The surgical and interventional schedule at UCI Medical Center's Main OR will be screened by the research team to identify the potential candidate(s). The Lead Researcher or Co-Researchers listed in the approved Protocol Narrative will initiate study consent, and provide the subject with the consent form during their consultation. On the day of the surgery, a study-team member will approach the potential subject to confirm the patient's willingness to participate in research. The Lead Researcher will then review the consent form with the patient, answer any questions the subject has and will finalize consent. The subject will be asked to sign the research consent form. In addition to the full disclosure of the risks and benefits of participating in the study, subjects will be informed that their participation is voluntary and their decision will not impact their standard of care.

2. N/A

3. The patient's privacy will be protected. Only the information relevant to the study will be obtained. UCIMC study team members will approach eligible subjects (based on prior screening of the UCIMC surgical record and patient medical history) and ask for consent in a private room. The subjects may choose to have their relatives be in the room during this consent process. Study team will make sure that the patient is comfortable and have all their questions/concerns answered prior to signing the consent form.

   The patient's information will be kept confidential; of data is written on paper, the paper will be either kept in the research folder which is kept in the hospital or shredded when it is not needed. If patient data is kept on a computer, the data will only be stored on hospital computers.

SECTION 6: INFORMED CONSENT PROCESS

1. Specify **how consent will be obtained** and describe the specific **steps for obtaining informed consent**.
2. Include information about **when and where** consent will take place and the **length of time** subjects will be given to decide whether they wish to participate.
3. If study team members will approach their own patients, students, or employees for participation in the study, explain what precautions will be taken to **minimize potential undue influence or coercion**, and **how compromised objectivity will be avoided**.
4. If children are involved in this study, please describe the **parental permission** process and the **child assent** process.
5. Be sure to **submit the consent/assent document(s)** with your e-IRB Application (i.e. Study Information Sheet, Recruitment script, Consent Form, etc.).
6. If this study involves the creation, use, or disclosure of Protected Health Information (PHI), specify the process for **obtaining HIPAA Authorization**. Be sure to submit the HIPAA Research Authorization form with your e-IRB Application.

Check all that apply:

[X] Written (signed) informed consent will be obtained from subjects. Signed informed consent, parental permission, and/or child assent will be obtained from subjects, as applicable. ***Describe the informed consent process.***

[ ] Requesting a waiver of written (signed) informed consent (i.e., signed consent will not be obtained)**.** Informed consent, parental permission and/or child assent will be obtained from subjects, as applicable. **Explain how informed consent will be obtained.** ***Complete Appendix P.***

[ ] Requesting a waiver of informed consent (i.e., consent will not be obtained). ***Complete Appendix O. Skip to Section 7.***

The Lead Researcher or Co-Researchers listed in the approved Protocol Narrative will initiate study consent, and provide the subject with the consent form during their consultation. The subjects will have ample time prior to the day of their scheduled procedure to make their decision. A written consent form and HIPAA will be required from all subjects.

All signed consent and HIPAA forms will be kept at the UCIMC and are only accessible to study team members at UCIMC. If the subject refuses to participate, we will immediately destroy all screening data related to the subjects and will not enroll the subject in this study.

7. **Non-English Speaking Participants:** In order to consent subjects who are unable to read and speak English, the English version of the consent form must be translated into appropriate languages once IRB approval is granted.

Check all that apply:

[ ] Not applicable - Only individuals who can read and speak English are eligible for this study.

[X] The English version of the consent form will be translated into appropriate languages for non-English speaking subjects once IRB approval is granted. An interpreter will be

involved in the consenting process. ***Note:*** *The IRB must officially stamp the translated consent forms.*

[ ] Requesting a short form consent process. ***Complete Appendix Q.***
The short form process will be used for the following languages:
[ ] All non-English languages
[ ] All non-English languages except Spanish
[ ] Other languages (specify): <Type here>

SECTION 7: RISK ASSESSMENT AND POSSIBLE BENEFITS

Note: *Review of the instructions for this section is strongly recommended.*

A. Risk Assessment

Place an "**X**" in the bracket **[ ]** next to the level of review (based upon the investigator's risk assessment).

[X] This study involves greater than minimal risk to subjects and requires **Full Committee review.**

[ ] This study involves no more than minimal risk and qualifies as **Expedited research**.
Provide justification below for the level of review and for the applicable Expedited Category(ies) that you have chosen: 1B.

B. Risks and Discomforts

1. Describe the **risks/potential discomforts** (e.g., physical, psychological, social, economic) associated with **each** intervention or research procedure.
2. Describe the expected frequency (i.e., **probability**) of a given side effect or harm and its severity (e.g., mild, moderate, severe).
3. If subjects are **restricted from receiving standard therapies** during the study, describe the risks of those restrictions.
4. If collecting identifiable private information, address the risk of a **potential breach of confidentiality**.

1. All risks are the same as standard of care.
2. The frequency is no different than standard of care
3. N/A
4. The possibility of breach of confidentiality is the same as any standard research.

5. Discuss what steps have been taken and/or will be taken to **prevent and minimize** any risks/ potential discomforts to subjects (address physical risks as well as other risks such as

the potential for a breach of confidentiality). Examples include: designing the study to make use of procedures involving less risk when appropriate; minimizing study procedures by taking advantage of clinical procedures conducted on the subjects; mitigating risks by planning special monitoring or conducting supportive inventions for the study.
Active routine monitoring and other measures will be taken to prevent and minimize any risks to the subjects. Subjects will be approached for consent in a private room, given sufficient time to sign the consent forms and have their questions answered by the principle investigator. We are minimizing study procedures by only recruiting subjects who would already be receiving sevoflurane in their surgery as standard of care. To prevent potential breach in confidentiality, all study data will be saved on a secure password protected server. All paper recorded data will be stored in a locked facility at UCIMC. The MAQUET Flow-i Anesthesia system utilizes an FDA approved low flow system that is also being and thus the device meets their standard of care practice. In the event that the MAQUET Flow-i does not induce appropriate anesthesia, it will follow the UCIMC standard procedures to fix any anesthetic system whether it be MAQUET or a conventional device

C. Potential Benefits

1. Discuss the potential benefits that may accrue **directly to subjects.** ***Note:*** *Compensation is not a benefit. Do not include it in this section.*
[X] There is no direct benefit anticipated for the subjects.
2. Describe the **potential societal/scientific benefit(s)** that may be expected from this study.
Due to the rising cost of healthcare, an accompanying rising concern is the cost of anesthesia care delivery. The low volume system has the ability to reduce the usage of anesthetic gas in surgical procedures, therefore reducing overall hospital expenditures, and enabling the hospital to provide quality patient care at reduced costs.

D. Risk/Benefit Assessment

Explain why the study risks are reasonable in relation to the **potential benefits** to subjects and society.
This study does not deviate from the standard of care in use on an already FDA approved device. What it does present in risk is in the collection of personally identifiable information, consistent with normal scientific collection that will be handled in a standard fashion and as described here within. The benefits of the knowledge yielded from this study have the potential to transform the industry and deliver justification for adoption of this system and others like it in the future to achieve goals.

SECTION 8: ALTERNATIVES TO PARTICIPATION

1. Describe the **standard or usual care** activities at UCI (or study site) that are available to prospective subjects who do not enroll in this study, as applicable.
2. Describe other **appropriate alternative procedures** to study participation that are available to prospective subjects.
3. If no alternatives exist, indicate that the only alternative is non-participation

[X] No alternatives exist. The only alternative to subjects is not to participate in the study.

Subjects will receive standard of care treatment with an FDA approved anesthetic machine regardless of participation of this research.

SECTION 9: ADVERSE EVENT REPORTING/MANAGEMENT AND COMPENSATION FOR INJURY

A. Adverse Events and Unanticipated Problems

1. Indicate that you are familiar with **UCI's Adverse Events/Unanticipated Problems** reporting policy and procedures. See http://www.research.uci.edu/ora/hrpp/adverseexperiences.htm for details.

[ ] Although this study involves no interaction/intervention with research subjects (i.e., involves the use of records, charts, biospecimens) an unanticipated problem may still occur (e.g., a breach in confidentiality), the researchers are aware of UCI's Unanticipated Problems involving Risk to Participants or Others reporting policy and procedures and will comply with this policy.

[X] This study involves interaction/intervention with research subjects. The researchers are aware of UCI's Unanticipated Problems involving Risk to Participants or Others reporting policy and procedures and will comply with this policy.

2. **If this study involves interaction/intervention with research subjects,** explain how the research team will **manage adverse events and unanticipated problems** that may occur during the study or after completion of the study (i.e., provide a plan).

[ ] Not applicable - This study involves **no interaction/intervention** with research subjects (i.e., involves the use of records, charts, and/or biospecimens).

Adverse events and unanticipated problems will be immediately reported to the IRB and the sponsor. If an adverse event occurs during the study, the medical team treating the patient will treat and manage the adverse event. If an adverse event occurs after completion of the study, depending on the severity, the patient will be asked to either call 911 or return to UC Irvine for treatment.

B. Compensation for Injury

For **Full Committee protocols**, explain how costs of treatment for research related injury will be covered.

[ ] Not applicable - This study involves no more than minimum risk and qualifies as **Expedited research**.

[X] Researchers are familiar with and will follow UC policy regarding treatment and compensation for injury. If subjects are injured as a result of being in the study, UCI will provide necessary medical treatment. The costs of the treatment may be covered by the University of California, the study sponsor, or billed to subject or the subject's insurer just like other medical costs, depending on a number of factors. The University and the study sponsor do not normally provide any other form of compensation for injury.

[ ] Other:

SECTION 10: PARTICIPANT COSTS

1. If subjects or their insurers will be charged for study procedures, **identify and describe those costs.**
2. Explain why it is **appropriate to charge those cost** to the subjects or their insurers. Provide supporting documentation as applicable (e.g., FDA Device letter supporting charges).

[ ] Not applicable - This study involves no interaction/intervention with research subjects (i.e., involves the use of records, charts, biospecimens).

[X] There are no costs to subjects/insurers. Subjects will be billed as usual for all related costs of their surgical procedure.

SECTION 11: PARTICIPANT COMPENSATION AND REIMBURSEMENT

1. If subjects will be compensated for their participation, explain **the method/terms of payment** (e.g., money; check; extra credit; gift certificate).
2. Describe the **schedule and amounts of compensation** (e.g., at end of study; after each session/visit) including the total amount subjects can receive for completing the study.
3. Specify whether subjects will be **reimbursed for out-of pocket expenses**. If so, describe any requirements for reimbursement (e.g., receipt).

Note: *Compensation should be offered on a prorated basis when the research involves multiple sessions.*

[ ] Not applicable - This study involves no interaction/intervention with research subjects (i.e., involves the use of records, charts, biospecimens).

[X] No compensation will be provided to subjects.

[X] No reimbursement will be provided to subjects.

SECTION 12: CONFIDENTIALITY OF RESEARCH DATA

1. Indicate all identifiers that may be included in the research records for the study. Check all that apply:

   Note: *If this information is being derived from a medical record; added to a medical record; created or collected as part of health care, or used to make health care decisions it qualifies as PHI under HIPAA. The subject's HIPAA Research Authorization is required or a waiver of HIPAA Authorization must be requested (Appendix T).*

[ ] No subject identifiers are obtained (i.e., researchers will not collect information that can link the subjects to their data)

OR

[X] Names	**[ ]** Social Security Numbers	**[ ]** Device identifiers/Serial numbers
[X] Dates*	**[X]** Medical record numbers	**[ ]** Web URLs
[ ] Postal address	**[ ]** Health plan numbers	**[ ]** IP address numbers
[ ] Phone numbers	**[ ]** Account numbers	**[ ]** Biometric identifiers
[ ] Fax numbers	**[ ]** License/Certificate numbers	**[ ]** Facial Photos/Images
[ ] Email address	**[ ]** Vehicle id numbers	**[ ]** Any other unique identifier

[ ] Other (Specify all): <Type here>

* birth date, treatment/hospitalization dates

2. Explain how data will be **recorded.**

Check all that apply:

[X] Paper documents/records
[X] Electronic records/database
[ ] Audio recording
[ ] Video recording
[ ] Photographs
[ ] Biological specimens
[ ] Other(s) (specify):

3. Indicate **how data will be stored, secured** including paper records, electronic files, audio/video tapes, biospecimens, etc.

Note: *If the research data includes subject identifiable private information and/or Protected Health Information, the storage devices or the electronic research files must be encrypted.*

Electronic Data (check all that apply):

[X] Coded data; code key is kept separate from data in secure location.
[ ] Data includes subject identifiable information. ***Note:*** *Encryption software is required.* (Provide rationale for maintaining subject identifiable info)**:**
[X] Data will be stored on secure network server.
[ ] Data will be stored on stand alone desktop computer (not connected to network/internet)
[ ] Other (specify here):

<u>Hardcopy Data, Recordings and Biospecimens</u> (check all that apply):
[X] Coded data; code key is kept separate from data in secure location.
[X] Data includes subject identifiable information (Provide rationale for maintaining subject identifiable info)**:**

We will only maintain subject identifiable for organization purposes only. Access to this information is limited to only study team members at UCIMC and must be approved by the lead researcher. All data will be de-identified before study team conducts any statistical tests, sharing data with MAQUET for research purposes.

[X] Data will be stored in locked file cabinet or locked room at UCI/UCIMC.
[ ] Data will be stored locked lab/refrigerator/freezer at UCI/UCIMC.
[ ] Other (specify here):

Data on Portable Devices:

4. Describe the **portable device(s) to be used** (e.g. laptop, PDA, iPod, portable hard drive including flash drives).
5. Specify whether **subject identifiable data** will be stored on the device. If so, **justify why** it is necessary to store subject identifiers on the device.

Note: *Only the "minimum data necessary" should be stored on portable devices as these devices are particularly susceptible to loss or theft. If there is a necessity to use portable devices for initial collection of identifiable private information, the portable storage devices or the research files* ***MUST BE ENCRYPTED****, and subject identifiers transferred to a secure system as soon as possible.*

[X] Not applicable – No study data will be maintained on portable devices.

Data Access:

6. Specify who, besides the entities listed below, will have **access to subject identifiable private data and records**.
7. If there is a **code key**, specify who on the research team will hold the key, and who will have access to the key.
8. If publications and/or presentations will include **subject identifiable information**, specify where the data will be **published and/or presented** and address how the study team will obtain permission from subjects.

Note: *Authorized UCI personnel such as the research team and the IRB, the study sponsor (if applicable), and regulatory entities such as the Food and Drug Administration (FDA) and the Office of Human Research Protections (OHRP), may have access to study records to protect subject safety and welfare. Any study data that identifies the subjects should not be voluntarily released or disclosed without the subjects' separate consent, except as specifically required by law. Publications and/or presentations that result from this study should not include subject*

identifiable information; unless the subject's separate consent has been obtained.

[ ] Not applicable – No subject identifiers will be collected.
[X] Not applicable – Only the entities listed above will have access to subject identifiable private data and records.

Only approved study team members at UCIMC will have access to identifiable information for research purposes only. The lead investigator will hold the code key and will only distribute to study team members when deemed appropriate.

Data Retention:

9. Explain **how long subject identifiable research data** will be **retained**. The data may include a code with a separate code key or the data may include subject identifiers.

Notes:

- ***If more than one of the options below is applicable*** *[e.g., the study involves children],* ***records should be kept for the longer period****.*
- *Research documentation involving Protected Health Information (PHI) should be retained for six years (e.g., IRB documentation, consent/assent forms –* ***NOT*** *the actual PHI). Investigators must destroy PHI at the earliest opportunity, consistent with the conduct of this study, unless there is an appropriate justification for retaining the identifiers or as required by law.*

[ ] Not applicable. No subject identifiable research data will be retained.

[ ] Destroy once data collection is completed

[ ] Destroy at the earliest opportunity, consistent with the conduct of this research. Specify timeframe: <Type here>

[ ] Destroy after publication/presentation

[X] Maintain for approximately <six> years. (e.g., 3 months, etc.)

[ ] Maintain in a repository indefinitely. Other researchers may have access to the data for future research. Any data shared with other researchers, will not include name or other personal identifying information. Note: ***Appendix M is required.***

[ ] Research records will be retained for seven years after all children enrolled in the study reach the age of majority [age 18 in California] as this study includes children .

[ ] Research records will be retained 25 years after study closure as this study involves in vitro fertilization studies or research involving pregnant women.

[X] As this is a FDA regulated study, research records will be retained for two years after an approved marketing application. If approval is not received, the research records will be kept for 2 years after the investigation is discontinued and the FDA is notified.

[ ] Other: <Type here>

Data Destruction:

10. If audio or video recordings will be taken, specify the **timeframe for the transcription and/or destruction of the audio and video recordings.**
11. If photographs will be collected, specify the **timeframe destruction of photographs.**

[X] Not applicable – No audio/video recordings or photographs will be collected. **[ ]** Audio or video recordings transcribed; specify time frame: <Type here> **[ ]** Audio or video recordings destroyed; specify time frame: <Type here> **[ ]** Audio or video recordings maintained indefinitely **[ ]** Photographs destroyed; specify time frame: <Type here> **[ ]** Photographs maintained indefinitely
Certificate of Confidentiality: 12. Specify whether a Certificate of Confidentiality (COC) has been or will be requested from the NIH. If yes, explain in what situations personally identifiable information protected by a COC will be disclosed by the UCI study team. ***Note:*** *If the COC has been secured a copy of the COC Approval Letter should accompany the IRB application or be provided to the IRB upon receipt.*
[X] Not applicable – No COC has been requested for this study.